Crystal Field Theory History

The second edition of this classic book provides an updated look at crystal field theory and its applications.

Biological magnetic resonance (NMR and EPR) is a rapidly expanding area of research with much activity in most universities and research institutions. International conferences are held biennially with an increasing number of participants. With the introduction of sophisticated and continuously im proving instrumentation, biological magnetic resonance is approaching the state of a common physical method in biochemical, biomedical, and bio logical research. The lack of monograpbs on the subject had been con spicuous for a long time. This gap started to close only recently. However, because of the rapid expansion and intensive research, many texts are dated by the time of their appearance. Therefore we have undertaken the editing of a series that is intended to provide the practicing chemist, biochemist, or biologist with the advances and progress in selected contemporary topics. In seeking to make the series as authoritative as possible, we have invited authors who have not only made significant contributions but who are also currently active in their fields. We hope that their expertise as well as their first hand experience as reflected in the chapters of this volume will be of benefit to the reader, inter alia, in planning his own experiments and in critically evaluating the current literature.

Mineralogical Applications of Crystal Field TheoryCambridge University Press

As it results from the very nature of things, the spherical symmetry of the surrounding of a site in a crystal lattice or an atom in a molecule can never occur. Therefore, the eigenfunctions and

eigenvalues of any bound ion or atom have to differ from those of spherically symmetric respective free ions. In this way, the most simplified concept of the crystal field effect or ligand field effect in the case of individual molecules can be introduced. The conventional notion of the crystal field potential is narrowed to its non-spherical part only through ignoring the dominating spherical part which produces only a uniform energy shift of gravity centres of the free ion terms. It is well understood that the non-spherical part of the effective potential "seen" by open-shell electrons localized on a metal ion plays an essential role in most observed properties. Light adsorption, electron paramagnetic resonance, inelastic neutron scattering and basic characteristics derived from magnetic and thermal measurements, are only examples of a much wider class of experimental results dependent on it. The influence is discerned in all kinds of materials containing unpaired localized electrons: ionic crystals, semiconductors and metallic compounds including materials as intriguing as high-Tc superconductors, or heavy fermion systems. It is evident from the above that we deal with a widespread effect relative to all free ion terms except those which can stand the lowered symmetry, e.g. S-terms. Despite the universality of the phenomenon, the available handbooks on solid state physics pay only marginal attention to it, merely making mention of its occurrence. Present understanding of the origins of the crystal field potential differs essentially from the pioneering electrostatic picture postulated in the twenties. The considerable development of the theory that has been put forward since then can be traced in many regular articles scattered throughout the literature. The last two decades have left their impression as well but, to the authors' best knowledge, this period has not been closed with a more extended review. This has also motivated us to compile the main achievements in the field in the form of a book.

The fourth edition of "The Chemistry of the Actinide and Transactinide Elements" comprises all chapters in volumes 1 through 5 of the third edition (published in 2006) plus a new volume 6. To remain consistent with the plan of the first edition, " ... to provide a comprehensive and uniform treatment of the chemistry of the actinide [and transactinide] elements for both the nuclear technologist and the inorganic and physical chemist," and to be consistent with the maturity of the field, the fourth edition is organized in three parts. The first group of chapters follows the format of the first and second editions with chapters on individual elements or groups of elements that describe and interpret their chemical properties. A chapter on the chemical properties of the transactinide elements follows. The second group, chapters 15-26, summarizes and correlates physical and chemical properties that are in general unique to the actinide elements, because most of these elements contain partially-filled shells of 5f electrons whether present as isolated atoms or ions, as metals, as compounds, or as ions in solution. The third group, chapters 27-39, focuses on specialized topics that encompass contemporary fields related to actinides in the environment, in the human body, and in storage or wastes. Two appendices at the end of volume 5 tabulate important nuclear properties of all actinide and transactinide isotopes. Volume 6 (Chapters 32 through 39) consists of new chapters that focus on actinide species in the environment, actinide waste forms, nuclear fuels, analytical chemistry of plutonium, actinide chalcogenide and hydrothermal synthesis of actinide compounds. The subject and author indices and list of contributors encompass all six volumes.

This book is a presentation of a qualitative theory of chemical bonding stressing the physical processes which occur on bond formation. It differs from most (if not

all) other books in that it does not seek to “rationalize” the phenomena of bonding by a series of mnemonic rules. A principal feature is a unified and consistent treatment across all types of bonding in organic, physical and inorganic chemistry. Contents: How Science Deals with Complex ProblemsWhat We Know About Atoms and MoleculesA Strategy for Electronic StructureThe Pauli Principle and OrbitalsA Model Polyatomic: MethaneLone Pairs of ElectronsOrganic Molecules with Multiple BondsMolecular SymmetryDiatomics with Multiple BondsDative BondsDelocalised Electronic Substructures: AromaticityOrganic and Inorganic ChemistryFurther Down the Periodic TableReconsidering Empirical RulesMavericks and Other LawbreakersThe Transition ElementsOmissions and Conclusions Readership: Chemistry undergraduates and graduate students, tutors and lecturers.

In this book, a synthesis of old and new notions straddling the disciplines of physics and chemistry is described.

Beginning with 1953, entries for Motion pictures and filmstrips, Music and phonorecords form separate parts of the Library of Congress catalogue. Entries for Maps and atlases were issued separately 1953-1955.

Axel Christian Klixbüll Jørgensen was a “Polyhistor”,one of the very few in the highly specialized science of our time.His interests and contributions in ch- istry

covered the whole Periodic Table.This statement demonstrates the breadth of his interests,however,it also sheds light on the constraints of chemistry which deals with a large, yet limited number of elements. It is not surprising that Jørgensen went beyond these limits,exploring the probable or plausible ch- istry of yet unknown elements and elementary particles such as quarks. Even chemistry itself did not place rigid limits on his mind,he was able to transfer his chemical concepts to scientific problems far beyond the normal such as in astrophysics. “Structure and Bonding” is intimately associated with the name C.K. J- gensen both as initiator and author over several decades.The appearance of a special edition in memory of this great scientist is a self-evident prolongation of his many contributions to the success of this series.

The development of mineralogy, the evolutionary changes in compre hending the mineral substance of the earth are closely associated with the progress of research methods. Over a space of more than two and half centuries, from the goniometry of the mineral crystals to microscopic petrography and optical mineralogy, to crystal structure determinations, electron micros copy and electron diffraction and finally investigations into their electri cal, magnetic and mechanical properties, all this has led to the formation of the existing system of mineralogy, its notions, theories and to a proper description of minerals. However, no matter

how great the variety of methods employed in mineralogy, they all come to a few aspects of substance characteristics. These are methods of determining the composition, structure and proper ties of the minerals. Thus the X-ray micro analyzer, the atom-absorption, neutron-activation, chromatographic and other analyses open up new opportunities for determining nothing else but the elementary com position of minerals.

Scientific realists claim we can justifiably believe that science is getting at the truth. However, they have faced historical challenges: various episodes across history appear to demonstrate that even strongly supported scientific theories can be overturned and left behind. In response, realists have developed new positions and arguments. As a result of specific challenges from the history of science, and realist responses, we find ourselves with an ever-increasing dataset bearing on the (possible) relationship between science and truth. The present volume introduces new historical cases impacting the debate and advances the discussion of cases that have only very recently been introduced. At the same time, shifts in philosophical positions affect the very kind of case study that is relevant. Thus, the historical work must proceed hand in hand with philosophical analysis of the different positions and arguments in play. It is with this in mind that the volume is divided into two sections, entitled "Historical Cases for the Debate" and "Contemporary Scientific Realism." All sides agree that historical cases are informative with regard to how, or whether, science connects with truth.

Defying proclamations as early as the 1980s announcing the death knell of the scientific realism debate, here is that rare thing: a philosophical debate making steady and definite progress. Moreover, the progress it is making concerns one of humanity's most profound and important questions: the relationship between science and truth, or, put more boldly, the epistemic relation between humankind and the reality in which we find ourselves.

Computational Photochemistry, Volume 16 provides an overview of general strategies currently used to investigate photochemical processes. Whilst contributing to establishing a branch of computational chemistry that deals with the properties and reactivity of photoexcited molecules, the book also provides insight into the conceptual and methodological research lines in computational photochemistry. Packed with examples of applications of modelling of basic photochemical reactions and the computer-aided development of novel materials in the field of photodegradation (paints), photoprotection (sunscreens), color regulation (photochromic devices) and fluorescent probes, this book is particularly useful to anyone interested in the effect of light on molecules and materials. * Provides an overview of computational photochemistry, dealing with principles and applications * Demonstrates techniques that can be used in the computer-aided design of novel photo responsive materials * Written by experts in computational photochemistry

These proceedings report the lectures and seminars presented at the NATO Advanced

Study Institute on "Optical Properties of Ions in Solids," held at Erice, Italy, June 6-21, 1974. The Institute was the first activity of the International School of Atomic and Molecular Spectroscopy of the "Ettore Majorana" Centre for Scientific Culture. The Institute consisted of a series of lectures on optical properties of ions in solids that, starting at a fundamental level, finally reached the current level of research. The sequence of lectures and the organization of the material taught were in keeping with a didactical presentation. In essence the Institute had the two-fold purpose of organizing what was known on the subject, and updating the knowledge in the field. Fif'teen series of lectures for a total of 44 hours were given. Five one-hour seminars and five twenty-minute seminars were presented. A total of 57 participants came from 40 laboratories in the following countries: Belgium, Canada, France, Germany, Ireland, Israel, Italy, Netherlands; Polatid, Romania, Switzerland, the United Ki~gdom, and the United States. The secretaries of the Institute were: D. Pacheco for the scientific aspects and A. La Francesca for the administrative aspects of the meeting. These proceedings report the lectures, the one-hour seminars (abstracts only) and the twenty-minute-seminars (titles only). The proceedings report also the contributions sent by Prof. K. Rebane and Dr. L. A. Rebane who, unfortunately, were not able to come.

With more than 40% new and revised materials, this second edition offers researchers and students in the field a comprehensive understanding of fundamental molecular properties amidst cutting-edge applications. Including ~70 Example-Boxes and

summary notes, questions, exercises, problem sets, and illustrations in each chapter, this publication is also suitable for use as a textbook for advanced undergraduate and graduate students. Novel material is introduced in description of multi-orbital chemical bonding, spectroscopic and magnetic properties, methods of electronic structure calculation, and quantum-classical modeling for organometallic and metallobiochemical systems. This is an excellent reference for chemists, researchers and teachers, and advanced undergraduate and graduate students in inorganic, coordination, and organometallic chemistry.

This proven book introduces the basics of coordination, solid-state, and descriptive main-group chemistry in a uniquely accessible manner, featuring a less is more approach. Consistent with the less is more philosophy, the book does not review topics covered in general chemistry, but rather moves directly into topics central to inorganic chemistry. Written in a conversational prose style that is enjoyable and easy to understand, this book presents not only the basic theories and methods of inorganic chemistry (in three self-standing sections), but also a great deal of the history and applications of the discipline. This edition features new art, more diversified applications, and a new icon system. And to better help readers understand how the seemingly disparate topics of the periodical table connect, the book offers revised coverage of the author's Network of Interconnected Ideas on new full color endpapers, as well as on a convenient tear-out card. Important Notice: Media content referenced

within the product description or the product text may not be available in the ebook version.

This Encyclopedia examines all aspects of the history of science in the United States, with a special emphasis placed on the historiography of science in America. It can be used by students, general readers, scientists, or anyone interested in the facts relating to the development of science in the United States. Special emphasis is placed in the history of medicine and technology and on the relationship between science and technology and science and medicine.

with contributions by numerous experts

Perhaps the title of this conference "Ctystalline Electric Field and Structural Effects in f-Electron Systems" reflects best the growth and direction of the field. The title and the conference itself go beyond "CEF" in two broad and important respects. First, the inter-relations between CEF and mode softenings, distortions due to quadruplar ordering or the Jahn Teller effect, have gained greater focus, hence the inclusion of . •• "Structral Effects. " Second, much greater emphasis on the actinides and, in particular, comparisons between actinides and the lighter rare earths is seen in this conference, hence the more general terminology . . . Iff-Electron Systems. " It seems clear that this comparison will lead to an extension to the actinides of mixed valence and Kondo considerations, as well as CEF

effects. The emergence of a broader discipline which includes all f-electron systems and which is concerned with unstable, as well as stable, valence reflects the maturation of the field and a coming to grips with the complexity, as well as the unity, of f-electron systems. This maturation is also seen in the growing realization of the effects of CEF on transport, thermodynamic properties, and superconductivity and its co-existence with magnetic order. This volume contains 63 articles, all but two of which were presented at the Conference held in Philadelphia, U. S. A. , on 12-15 November, 1979. About 100 conferees from 13 countries attended the meeting which consisted of four full days of lecture presentations.

From basic principles of luminescence to innovative technical applications, Phosphor Handbook will serve as the definitive resource on phosphors. Considering all the major changes in the field of phosphors, the editors have produced the most current and comprehensive reference available today. Contributed by noted worldwide scientists and engineers, the handbook serves a ready audience among researchers in the field of luminescence. This book completely describes: powder phosphors, including information on solid state laser materials and organic EL properties and technical applications of phosphors, including the principal classes of phosphors, procedures to

synthesize and manufacture these phosphors, manner of deployment, and materials that emit light under various kinds of excitation current developments of phosphor materials required in advanced display technologies, such as UV Plasma Display and Field Emission Display (FED) experimental techniques characterizing materials in their initial and final forms Other provisos include: tutorials of fundamental physical and chemical properties of phosphor materials descriptions of optical properties of phosphor materials profiles on methods of synthesis and manufacture of all practical phosphors analysis of experimental procedures for the optical characterization of raw phosphors and the creation of display devices or lamps specification of physical and optical requirements for all applications of phosphors in lighting and display technologies Japanese industry has and will continue to play a key role in developing these applications, and many contributors to this volume acted as principals in the progress discussed. Display technologies will increase in importance, and no cohesive or comprehensive treatise exists - from basic to applied - on the nature, properties, synthesis, characterization, manufacture, and handling of phosphor materials in lighting and display technologies and applications. This exceptional handbook rectifies this deficiency, serving as the defining resource for all those engaged in research or in the application of phosphor materials - regardless of whether they

are newcomers or veterans in this endeavor.
In order to use rare earths successfully in various applications, a good understanding of the chemistry of these elements is of paramount importance. Nearly three to four decades have passed since titles such as The Rare Earths edited by F.H. Spedding and A.H. Daane, The chemistry of the Rare Earth Elements by N.E. Topp and Complexes of the Rare Earths by S.P. Sinha were published. There have been many international conferences and symposia on rare earths, as well as the series of volumes entitled Handbook of Physics and Chemistry of Rare Earths edited by K.A. Gschneidner and L. Eyring. Thus, there is a need for a new title covering modern aspects of rare earth complexes along with the applications. The present title consists of twelve chapters. 1. Introduction 2. General aspects 3. Stability of complexes 4. Lanthanide complexes 5. Structural chemistry of lanthanide compounds 6. Organometallic complexes 7. Kinetics and mechanisms of rare earths complexation 8. Spectroscopy of lanthanide complexes 9. Photoelectron spectroscopy of rare earths 10. Lanthanide NMR shift reagents 11. Environmental ecological biological aspects 12. Applications The authors studied in schools headed by pioneers in rare earth chemistry, have a combined experience of one hundred and fifty years in inorganic chemistry, rare earth complex chemistry, nuclear and radiochemistry of

rare earths and supramolecular chemistry. The present monograph is a product of this rich experience.

This book provides an introduction to the important methods of chiroptical spectroscopy in general, and circular dichroism (CD) in particular, which are increasingly important in all areas of chemistry, biochemistry, and structural biology. The book can be used as a text for undergraduate and graduate students and as a reference for researchers in academia and industry, with or without the companion volume in this set. Experimental methods and instrumentation are described with topics ranging from the most widely used methods (electronic and vibrational CD) to frontier areas such as nonlinear spectroscopy and photoelectron CD, as well as the theory of chiroptical methods and techniques for simulating chiroptical properties. Each chapter is written by one or more leading authorities with extensive experience in the field.

Good,No Highlights,No Markup,all pages are intact, Slight Shelfwear,may have the corners slightly dented, may have slight color changes/slightly damaged spine.

The fascinating phenomenon ferromagnetism is far from being fully understood, although it surely belongs to the oldest problems of solid state physics. For any investigation it appears recommendable to distinguish between materials whose

spontaneous magnetization stems from localized electrons of a partially ?lled atomic shell and those in which it is due to itinerant electrons of a partially ?lled conduction band. In the latter case one speaks of band-ferromagnetism, prototypes of which are the classical ferromagnets Fe, Co, and Ni. The present book is a status report on the remarkable progress that has recently been made towards a microscopic understanding of band-ferromagnetism as an electron c- relation e?ect. The authors of the various chapters of this book “Band-Ferromagnetism: Ground-State and Finite-Temperature Phenomena” participated as selected - perts in the 242nd WE-Heraeus-Seminar (4-6 October 2000) held under almost the same title in Wandlitz near Berlin (Germany). It was the second seminar of this type in Wandlitz. (The ?rst in 1998 dealt with the complementary topic of the physics of local-moment ferromagnets such as Gd). Twenty-six invited spe- ers from ten di?erent countries together with ?fty-?ve further participants, who presented contributions in form of posters, spent three days together discussing in an enthusiastic and fertile manner the hot topics of band-ferromagnetism.

French science-fiction (SF) is as old as the French language. Cyrano de Bergerac wrote about a trip to the moon that was published back in 1657, as did Jules Verne in 1865, this time using hard, scientific facts. The first movie showing

a trip to the moon was made by Georges Méliès in 1902. In the comics' format, Hergé had Tintin walk on the moon in 1954, 15 years before Neil Armstrong. These are just a few of the many unique French contributions to SF that rightly deserve to be better known. One of the purposes of this collection is to introduce French SF to an English-speaking audience. Rediscovering French Science Fiction... first revisits proto science-fiction from authors like Cyrano de Bergerac and Jules Verne, before delving into contemporary science-fiction works from authors such as René Barjavel and Jacques Spitz. A contribution from preeminent SF author Élisabeth Vonarburg, from Québec, helps to understand the constraints and advantages of writing SF in French. A third section is devoted to French SF in movies and graphic novels, media where French creators have been recognized worldwide. This collection explores many aspects of French SF, including the genre's deep roots in popular culture, the influence of key authors on its historical development, and the form and function of science and fantasy, as well as the impact of films and graphic novels on the public perception of the genre's nature.

J.P. Dahl: Carl Johan Ballhausen (1926–2010).- J.R. Winkler and H.B. Gray: Electronic Structures of Oxo-Metal Ions.- C.D. Flint: Early Days in Kemisk Laboratorium IV and Later Studies.- J.H. Palmer: Transition Metal Corrole

Coordination Chemistry. A Review Focusing on Electronic Structural Studies.- W.C. Trogler: Chemical Sensing with Semiconducting Metal Phthalocyanines.- K.M. Lancaster: Biological Outer-Sphere Coordination.- R.K. Hocking and E.I. Solomon: Ligand Field and Molecular Orbital Theories of Transition Metal X-ray Absorption Edge Transitions.- K.B. Møller and N.E. Henriksen: Time-resolved X-ray diffraction: The dynamics of the chemical bond.